1. Consider the dynamical system

\[ u(n) = 0.3u(n - 1) - 0.5v(n - 1) + 30 \]
\[ v(n) = 0.2u(n - 1) + v(n - 1) - 4 \]

(a) Find the equilibrium point.

The equilibrium point for \((u, v)\) is \((20, 32)\).

(b) Does the equilibrium point appear to be stable or unstable? Show enough work to justify your answer.

The equilibrium point \((20, 32)\) appears to be stable.

2. Suppose the population of a town is currently 800, and it is growing by 20 people per year. Let \(u(n)\) represent the population of this town \(n\) years from now.

(a) Find a discrete dynamical system along with an initial value for \(u(n)\).

\[ u(n) = u(n - 1) + 20 \]
\[ u(0) = 800 \]

(b) Find an explicit formula for \(u(n)\).

\[ u(n) = 20n + 800 \]
3. Suppose the population of a town is currently 600, and it is growing by 5% per year. Let \( u(n) \) represent the population of this town \( n \) years from now.

(a) Find a discrete dynamical system along with an initial value for \( u(n) \).

\[
\begin{align*}
  u(n) &= 1.05u(n - 1) \\
  u(0) &= 600
\end{align*}
\]

(b) Find an explicit formula for \( u(n) \).

\[
  u(n) = 600(1.05)^n
\]